Patent Claims:

1 – 23 (canceled)

24. (new) A system for influencing an induction gas temperature in a combustion chamber of an internal combustion engine, comprising:

a compression device to compress induced fresh air and the fresh air having a first temperature before compression;

an expansion device that causes an expansion of the compressed induced fresh air, with the compressed and subsequently expanded fresh air having a second temperature greater than the first temperature; and

a temperature sensor to record the second temperature that is arranged in the direction of flow of the fuel/air with reference to the expansion device so that this can be taken into account within the framework of regulating the induction gas temperature.

25. (new) The system in accordance with claim 24, wherein an exhaust gas recirculation device is provided to feed exhaust gas from an earlier combustion cycle to fresh air or to a mixture featuring fresh air, in order to provide an air/fuel/exhaust gas mixture with an advantageous energy level for combustion after injection of fuel.

26. (new) The system in accordance with claim 24, wherein the compression device is an exhaust gas turbocharger.

27. (new) The system in accordance with claim 24, wherein the compression device is a compressor.

28. (new) The system in accordance with claim 24, wherein the expansion is performed on a throttle valve.

29. (new) The system in accordance with claim 24, wherein at least one heat exchanger operating as an exhaust gas cooler is provided for reducing the temperature of the re-circulated exhaust gas and a coolant setting valve is provided so that an induction gas temperature can be set or regulated by influencing the coolant through-flow through the exhaust gas cooler taking into account measured values or values determined on the basis of

technical models.

30. (new) The system in accordance with claim 24, wherein an exhaust gas cooler is arranged in a separate heat exchanger circuit.

31. (new) The system in accordance with claim 24, wherein the exhaust gas cooler is arranged in an engine coolant circuit.

32. (new) The system in accordance with claim 24, wherein an exhaust gas cooler is designed as an engine or transmission oil heat exchanger respectively.

33. (new) The system in accordance with claim 24, wherein the measured values or the values determined in accordance with technical models are assigned to at least one of the variables selected from the group consisting of: exhaust gas temperature, recirculated exhaust gas mass, recirculated exhaust gas quantity, air/fuel temperature, air/fuel mass, air/fuel quantity, induction gas temperature, induction gas mass, induction gas quantity, coolant temperature, oil temperature of the coolant, oil flowing through the exhaust gas cooler, coolant mass, oil mass, coolant quantity, oil quantity of the coolant, and oil flowing through the exhaust gas cooler.

34. (new) The system in accordance with claim 24, wherein a temperature sensor to record the air/fuel temperature, a temperature sensor to record the exhaust gas temperature at the engine exhaust, an air mass or quantity measurement device respectively to record the air/fuel mass or quantity, and an exhaust gas mass or quantity measuring device to record the exhaust gas mass or quantity are provided.

35. (new) The system in accordance with claim 24, wherein the induction gas temperature is calculated in accordance with equation

$$T_{ASG} = \frac{\dot{m}_{FG} T_{FG} C_{p,FG} + \dot{m}_{AG} T_{AG} C_{p,AG}}{\dot{m}_{FG} C_{p,FG} + \dot{m}_{AG} C_{p,AG}}$$

with

$\dot{m}_{FG}$: Air/fuel mass flow

$\dot{m}_{AG}$: Exhaust gas mass flow

T_{FG}: Air/fuel temperature

T_{AG}: Exhaust gas temperature

T_{ASG}: Induction gas temperature

$c_{p,FG}$: Heat capacity of the air/fuel mixture

$C_{p,AG}$: Heat capacity of the exhaust gas.

36. (new) The system in accordance with claim 24, wherein the exhaust gas temperature at the heat exchanger outlet is calculated using the following equation system:

$$|\Delta\dot{Q}_{KM}| = |\Delta\dot{Q}_{AG}| = \dot{Q}_{WT};$$

$$\Delta\dot{Q}_{KM} = \dot{m}_{KM}C_{p,KM}(T_{KM,OUT} - T_{KM,IN});$$

$$\Delta\dot{Q}_{AG} = \dot{m}_{AG}C_{p,AG}(T_{AG,IN} - T_{AG,OUT});$$

$$\dot{Q}_{WT} = kA\Delta T_m$$

with

$\dot{Q}$: Heat flow

KM: Coolant

AG: Exhaust gas

WT: Heat exchanger

C_p: Heat capacity

k: Heat transfer coefficient of the heat exchanger

A: Heating surface of the heat exchanger

ΔT_m Mean logarithmic temperature difference.

37. (new) A method for influencing an induction gas temperature of an internal combustion engine, comprising:

compressing induced fresh air having a first temperature before compression;

expanding the compressed induced fresh air such that the compressed and subsequently expanded fresh air has a second temperature greater than the first temperature;

recording the second temperature after the expansion so it can be taken into account within a framework of a regulation of the induction gas temperature.

38. (new) The method according to Claim 37, wherein exhaust gas from an earlier combustion cycle is fed into fresh air or into a mixture featuring fresh air respectively in order to provide an air/fuel/exhaust gas mixture with an energy level advantageous for combustion.

39. (new) The method in accordance with Claim 37, wherein the compression is performed by an exhaust gas turbocharger.

40. (new) The method in accordance with Claim 37, wherein the compression is performed by a compressor.

41. (new) The method in accordance with Claim 37, wherein the expansion is performed on a throttle valve.

42. (new) The method in accordance with Claim 37, wherein exhaust gas is cooled in a heat exchanger operating as an exhaust gas cooler for reducing a temperature of a recirculated exhaust gas and by influencing the coolant throughflow through the exhaust gas cooler by means of a coolant setting valve taking into account measured values or values determined from technical models, the induction gas temperature is set or regulated respectively.

43. (new) The system in accordance with claim 37, wherein the measured values or the values determined in accordance with technical models are assigned to at least one of the variables selected from the group consisting of: exhaust gas temperature, recirculated exhaust gas mass, recirculated exhaust gas quantity, air/fuel temperature, air/fuel mass, air/fuel quantity, induction gas temperature, induction gas mass, induction gas quantity, coolant temperature, oil temperature of the coolant, oil flowing through the exhaust gas cooler, coolant mass, oil mass, coolant quantity, oil quantity of the coolant, and oil flowing through the exhaust gas cooler.

44. (new) The method in accordance with Claim 42, wherein the air/fuel temperature, the exhaust gas temperature at the engine exhaust, the air/fuel mass or quantity respectively and the exhaust gas mass or quantity respectively are measured.

45. Method in accordance with Claim 44, wherein the induction gas temperature is calculated in accordance with equation

$$T_{ASG} = \frac{\dot{m}_{FG} T_{FG} C_{p,FG} + \dot{m}_{AG} T_{AG} C_{p,AG}}{\dot{m}_{FG} C_{p,FG} + \dot{m}_{AG} C_{p,AG}}$$

, with

$\dot{m}_{FG}$: Air/fuel mass flow

$\dot{m}_{AG}$: Exhaust gas mass flow

T_{FG}: Air/fuel temperature

T_{AG}: Exhaust gas temperature

T_{ASG}: Induction gas temperature

$c_{p,FG}$: Heat capacity of the air/fuel mixture

$C_{p,AG}$: Heat capacity of the exhaust gas.

46. (new) The method in accordance with Claim 42, wherein the exhaust gas temperature at the heat exchanger outlet is calculated using the following equation system:

$$|\Delta\dot{Q}_{KM}| = |\Delta\dot{Q}_{AG}| = \dot{Q}_{WT};$$

$$\Delta\dot{Q}_{KM} = \dot{m}_{KM}C_{p,KM}(T_{KM,OUT} - T_{KM,IN});$$

$$\Delta\dot{Q}_{AG} = \dot{m}_{AG}C_{p,AG}(T_{AG,IN} - T_{AG,OUT});$$

$$\dot{Q}_{WT} = kA\Delta T_m$$

with

$\dot{Q}$: Heat flow

KM: Coolant

AG: Exhaust gas

WT: Heat exchanger

C_p: Heat capacity

k: Heat transfer coefficient of the heat exchanger

A: Heating surface of the heat exchanger

ΔT_m Mean logarithmic temperature difference.